barrel-shaped areola (fig. 3); it has a relatively low anterior process on the lateral pronotum; and in common with *evansi*, it has coarse punctures on the abdominal terga. The female is also larger than the other two species. It has heavily infuscated forewings which are frequently densely pubescent.

The holotype of this species is from San Blas, Nayarit. Specimens have been identified from several localities distributed through the states of Oaxaca, Guererro, Morelos, Michoacan, Jalisco, Nayarit, San Luis Potosi, Vera Cruz, and Tamaulipas. I have identified a total of 26 males and 13 females.

Reference

Allen, H. W. *and* **Karl V. Krombein.** 1964. A revision of *Neotiphia* Malloch and *Krombeinia* Pate (Hymenoptera: Tiphiidae). Trans. Amer. Ent. Soc. 89:211–275.

BIOLOGICAL NOTES ON THE BEE TETRALONIA MINUTA AND ITS CLEPTOPARASITE, MORGANIA HISTRIO TRANSVAALENSIS

(Hymenoptera: Anthophoridae)

Jerome G. Rozen, Jr., *Department of Entomology, The American Museum of Natural History, New York, New York 10024*

ABSTRACT—The biologies of the South African eucerine bee *Tetralonia minuta* Friese and of its nomadine parasite, *Morgania histrio transvaalensis* Bischoff, are discussed.

On a recent trip to South Africa I had a chance to observe briefly the nesting habits of a bee belonging to the genus *Tetralonia* Spinola and the biology of its cuckoo bee parasite *Morgania* Smith. Because little is known about the biology of either genus, these notes are presented here. Adults of the *Tetralonia* are conspecific with the type of *T. minuta* Friese in the Institut für Spezielle Zoologie und Zoologisches Museum, Humboldt-Universität, Berlin, and those of the *Morgania* agree with the male type of *M.* (*Omachthes*) *histrio transvaalensis* Bischoff in the Transvaal Museum, Pretoria, Republic of South Africa.

Adults, immature stages, and samples of cells and cocoons are in the collection of the American Museum of Natural History. The research for this paper was supported by National Science Foundation Grant GB-5407X.

Biology of **Tetralonia minuta** Friese

Description of Nesting Area: Mr. Denis Brothers found this species nesting in the ground at 3 miles west of Grahamstown, Republic of

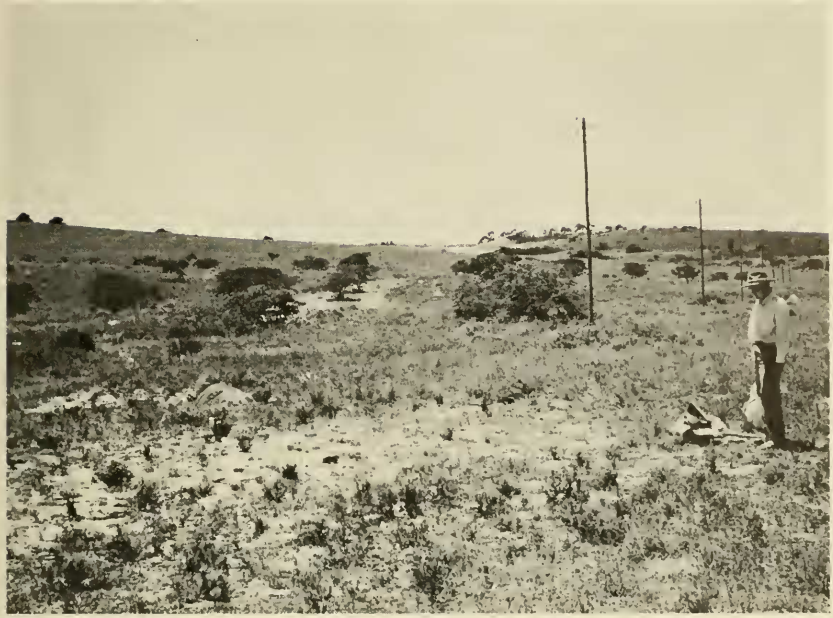
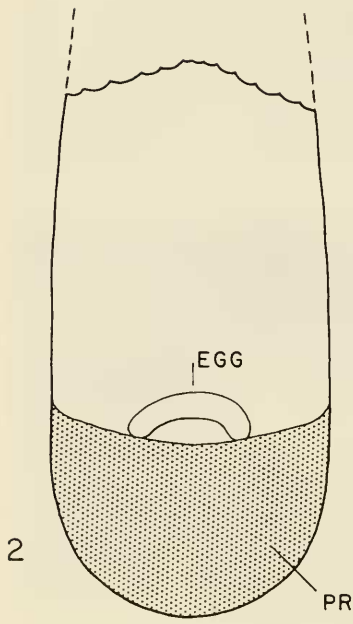


Fig. 1, Nesting site of *Tetralonia minuta* Friese, 3 miles west of Grahamstown, Republic of South Africa.

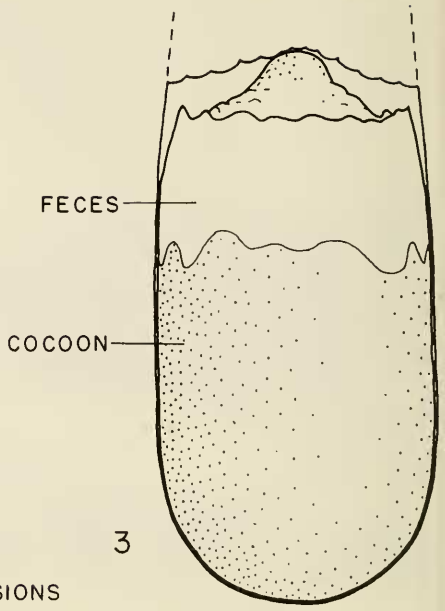
South Africa, on November 29, 1966. The slightly sloping site (fig. 1), approximately 30 feet long and bare except for widely scattered low vegetation, occurred in a region that was predominantly grassland. The even-grained, clay-like soil was very hard and dry near the surface but was moist and softer below a depth of 10 cm. The surface had a thin crust in many places.

Nesting Activity: The nests were irregularly scattered over most of the barren area. Where they were most dense, 15 to 25 holes per square meter were visible. However, some may have been emergence holes rather than nest entrances. Although a few openings were in small clumps of vegetation, others were not associated with vegetation or other objects. None had a turret, and most lacked tumuli which were probably blown away because the excavated soil did not adhere to the hard surface crust. The few with tumuli were eccentrically located. The fine, dry nature of the tumuli indicates that *Tetralonia* does not excavate with water. One tumulus was low and about 4 cm. across.

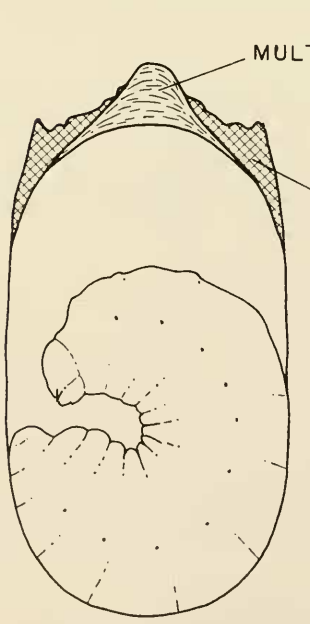
The main burrow is circular in cross section, about 5.0 mm. in diameter, open, unlined, and without an antechamber. It descends vertically in a meandering fashion even though the soil lacked rocks.



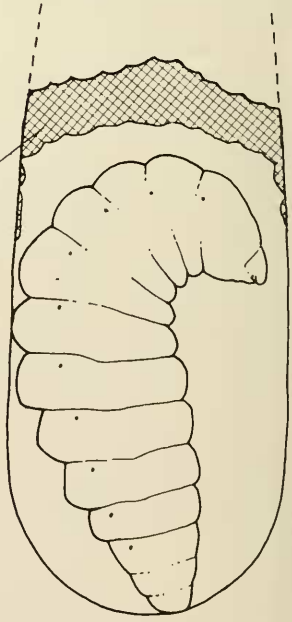
2



3



4



5

So far as is known, only one female occupies a nest. Side tunnels leading to completed cells are filled.

Numerous cells from both the current generation and previous generations were situated at a depth between 15 and 30 cm. Their elongate, parallel-sided shape (fig. 2) is nearly identical to that of the cells of *Svastra obliqua obliqua* (Say) (Rozen, 1964) and *Xenoglossa* (Bohart, 1964; Linsley, MacSwain, and Smith, 1955), and apparently to those of *Florilegus condignus* (Cresson) (LaBerge, 1966) and *Melissodes* (Hurd and Linsley, 1959; Thorp and Chemsak, 1964), and they are vertical or tilted at most 30 degrees from the vertical. Approximately 12 mm. in length and 6 mm. in maximum diameter, they are lined with a thin, waterproof coating of waxlike material, but, in contrast to the cells of *Svastra*, they possess no "built-in" wall insofar as could be determined. The wall, however, is probably impregnated with some secretion because it is harder than the surrounding soil. The cell closure is a spiral, slightly concave on the inside. Some cells are arranged in linear series of two, whereas others are single.

The female *Tetralonia* provisions the bottom of the cell to a depth of about 4.25 mm. with orange-colored pollen and nectar. In several cells containing eggs, the upper half of the provisions were moist, the lower part was nearly dry, and the upper surface was concave. There was no odor of fermentation in any of the cells, which, however contained only freshly deposited eggs; fermentation in the cells of *Svastra* (Rozen, 1964) developed while the eggs incubated.

The eggs are cylindrical, blunt at both ends, and possess an opaque white chorion. They appear identical to those of *Svastra* except that they are more arched at one end than at the other and that they are smaller (one measured 2.8 mm. long and 0.65 mm. at maximum diameter). The female deposits the egg near the center of the top surface of the food (fig. 2).

Many mature postdefecating larvae were excavated, all in cocoons. White and flaccid, the larvae are oriented as shown in figure 4, with the dorsum of abdominal segments IV to VI adhering, as if glued, to the cocoon. Defecation is completed before cocoon spinning, as evidenced by the fact that all feces are deposited at the upper end of the cell above the cocoon. All of the cocoon (fig. 3), except for the top, is appressed to the cell wall. Semitransparent, brown, and parchment-like, the lower part seems to consist of but a single layer.

←

Figs. 2–5, *Tetralonia minuta* Friese: 2, cell containing provisions and egg; 3, cell containing cocoon; 4, cross-section of cocoon with mature, postdefecating larva; 5, cell containing mature, postdefecating larva of *Morgania histrio transvaalensis* Bischoff.

Careful examination, however, reveals that a number of closely applied, thin layers are involved. The top of the cocoon (fig. 4) consists of even more layers which, however, are somewhat separated, forming a central nipple-shaped projection. The heavily insulated top and the feces perhaps help exclude potential parasites. In general, the cocoon and meconial mass resemble closely those of *Melissodes pallidisignata* Cockerell (Thorp and Chemsak, 1964), *Svastra* (Rozen, 1964), and *Xenoglossa* (Linsley, MacSwain, and Smith, 1955; Bohart, 1964), and to a lesser extent those of *Florilegus* (LaBerge, 1966).

The adult bee emerges from the cell by chewing through the top of the cocoon and the feces or by chewing a hole in the side of the cocoon.

Adult Activity: Males of *Tetralonia* searching for females were commonly seen flying low and swiftly over the nesting site, and pairs occasionally buzzed and tumbled on the ground. Both females and males were already active on a clear warm day at 9:40 A.M.

At the time the observations were made many males and females were flying, and the cells constructed by these females were at most only freshly provisioned. However, many quiescent, mature larvae, but not pupae, were also excavated; they undoubtedly were individuals that had not developed from the previous generation.

Parasites: In addition to the larvae of *Morgania*, larvae of a meloid and mutillid cocoons were found in the cells.

Biology of **Morgania histrio transvaalensis** Bischoff

Flying low over the nesting site and slower than the males of *T. minuta*, females of *M. histrio transvaalensis* stopped momentarily to examine burrows like those of the *Tetralonia*. Occasionally a female descended into a nest, only to reappear in seconds, obviously before she had time to deposit an egg.

Two mature postdefecating larvae and two active pupae of *M. histrio transvaalensis* were discovered in the cells of *T. minuta*. Both larvae (fig. 5) and pupae were oriented head highest in the cell. The feces had been deposited primarily at the extreme upper end of the cell (fig. 5) in contrast with those of other nomadine parasitic bees, which deposit the meconial material over the entire cell wall. No cocoon is spun and the larvae have a rigid integument in contrast with the flaccid integument of the host. In several parasitized cells a hole in the cell wall was detected just below the cell closure. These punctures are believed to be where the *Morgania* eggs had been inserted.

References

Bohart, G. E. 1964. Notes on the biology and larval morphology of *Xenoglossa strenua* (Hymenoptera: Apoidea). Pan-Pacific Ent. 40:174–182.

Hurd, P. D., Jr. *and* **E. G. Linsley.** 1959. Observations on the nest-site behavior of *Melissodes composita* Tucker and its parasites, with notes on the communal use of nest entrances (Hymenoptera: Apoidea). Ent. News 70: 141–146.

LaBerge, W. E. *and* **D. W. Ribble.** 1966. Biology of *Florilegus condignus* (Hymenoptera: Anthophoridae), with a description of its larva, and remarks on its importance in alfalfa pollination. Ann. Ent. Soc. Amer. 59:944–950.

Linsley, E. G., J. W. MacSwain, *and* **R. F. Smith.** 1955. Biological observations on *Xenoglossa fulva* Smith with some generalizations on biological characters of other eucerine bees (Hymenoptera, Anthophoridae). Bull. S. Calif. Acad. Sci. 54:128–141.

Rozen, J. G., Jr. 1964. The biology of *Svastra obliqua obliqua* (Say), with a taxonomic description of its larvae (Apoidea, Anthophoridae). Amer. Mus. Novitates, no. 2170, pp. 1–13, 15 figs.

Thorp, R. W. *and* **J. A. Chemsak.** 1964. Biological observations on *Melissodes* (*Eumelissodes*) *pallidisignata* (Hymenoptera: Anthophoridae). Pan-Pacific Ent. 40:75–83.

GONODONTIS PEPLARIA GEYER, A NOCTUID, NOT A GEOMETRID (LEPIDOPTERA)

Zethes peplaria (Geyer) n. comb.

Gonodontis peplaria Geyer, 1832, *in* Hübner, Zut. Samm. Exot. Schmett. 4:27, plate [122], figures 709–710.
Azelina ? *peplaria*: Walker, 1860, List Spec. Lepid. Coll. Brit. Mus. 20:186.
Azelina peplaria: Hulst, 1895, Ent. News 6:14.

The association of the name *peplaria* Geyer with the genus *Pero* (= *Azelina*) is incorrect, and this species is a noctuid and not a geometrid. Walker first placed *peplaria* in the genus *Azelina*, and it was subsequently used for the common eastern North American species of *Pero*, *P. honestarius*, until Grossbeck (1910, Proc. U. S. Nat. Mus. 38:365) stated that it was not this species. Unfortunately, he was not able to identify it, and the name has remained unplaced since then.

It is almost certain that this is a species of the genus *Zethes* (Noctuidae), and probably *Zethes insularis* Rambur, although I hesitate to make the synonymy without having seen the type of *peplaria*. This species, *Z. insularis*, comes from southern Europe and not North America as given in the description of *peplaria*.

I wish to thank Mr. B. Nye, Mr. W. H. T. Tams, and Mr. D. S. Fletcher of the British Museum of Natural History, Dr. E. L. Todd of the United States National Muesum, and Dr. J. G. Franclemont of Cornell University for help with this matter.—ROBERT W. POOLE, *Department of Entomology, Cornell University, Ithaca, New York 14850.*